AMENDMENTS TO THE CLAIMS

1. (Previously Presented) A method for processing seismic data to estimate a time shift resulting from velocity anisotropy in the earth's subsurface, comprising: forming a gather of seismic data traces; and cross-correlating seismic data traces included in said gather within a time window to estimate a time shift in the seismic data traces resulting from velocity anisotropy in the earth's subsurface.

2. (Previously Presented) The method of claim 1 further comprising adjusting seismic data traces included in said gather by the amount of the estimated time shift.

3. (Original) The method of claim 2 further comprising performing an amplitude variation with incidence angle analysis on said adjusted seismic data traces.

4. (Original) The method of claim 2 further comprising performing an amplitude variation with azimuth analysis on said adjusted seismic data traces.

5. (Previously Presented) The method of claim 2 further comprising: determining the incidence angle for seismic data traces included in said gather; and calculating the amplitude variation with azimuth and amplitude variation with offset by applying a least squares analysis process to reflection coefficient, source-receiver azimuth angle and incidence angle data for seismic

data traces included in said gather.

6. (Previously Presented) The method of claim 1 further comprising applying a least squares analysis process to the time shift of said seismic data traces to calculate the velocity variation with azimuth in seismic data traces included in said gather.

7. (Original) A method for processing seismic data comprising: forming a gather of seismic data traces; performing a surface consistent statics computation on seismic data traces included in said gather; cross-correlating successively selected seismic data traces in said gather to estimate the time shift in seismic data traces included in said gather resulting from azimuthal velocity anisotropy in the earth's subsurface, applying a least squares analysis process to the time shifts of said seismic data traces to calculate the velocity variation with azimuth in seismic data traces included in said gather; utilizing the calculated velocity variations with azimuth to calculate time shifts in seismic data traces included in said gather; applying said calculated time shifts to said seismic data traces included in said gather; and applying a least squares analysis process to reflection coefficient, source-receiver azimuth angle and incidence angle data for seismic data traces included in said gather to calculate the amplitude variation with azimuth and amplitude variation with offset in seismic data traces included in said gather.

8. (Original) A method for processing seismic data to estimate a time shift resulting from velocity anisotropy in the earth's subsurface, comprising: forming a gather of seismic data traces; forming a pilot trace by combining a selected plurality of said seismic data traces within a selected time window; and cross-correlating a selected seismic data trace included in said gather with said pilot trace to estimate the time shift in said selected seismic data trace resulting from velocity anisotropy in the earth's subsurface.

9. (Original) A method for processing seismic data to estimate time shift resulting from velocity anisotropy in the earth's subsurface, comprising: (a) forming a gather of seismic data traces; (b) forming a pilot trace by combining a selected plurality of said seismic data traces within a selected time window; (c) cross-correlating a selected seismic data trace included in said gather with said pilot trace to estimate the time shift in said selected seismic data trace resulting from velocity anisotropy in the earth's subsurface; and repeating steps (b)and (c) until all seismic data traces within said gather have been cross-correlated with a pilot trace.

10. (Original) A method for processing seismic data, comprising: (a) forming a gather of seismic data traces; (b) forming a pilot trace by combining a selected plurality of said seismic data traces within a selected time window; (c) cross-correlating a selected seismic data trace included in said gather with said pilot trace to estimate the time shift in said selected seismic data trace resulting from velocity anisotropy in the earth's subsurface; repeating steps (b) and

(c) until all seismic data traces within said gather have been cross-correlated with a pilot trace; and adjusting each said selected seismic data trace by the amount of the estimated time shift in each said selected seismic data trace resulting from velocity anisotropy.

11. (Original) The method of claim 10 further comprising performing an amplitude variation with incidence angle analysis on said adjusted seismic data traces.

12. (Original) The method of claim 10 further comprising performing an amplitude variation with azimuth analysis on said adjusted seismic data traces.

13. (Original) A method for processing seismic data, comprising: (a) forming a gather of seismic data traces; (b) forming a pilot trace by combining a selected plurality of said seismic data traces within a selected time window; (c) cross-correlating a selected seismic data trace included in said gather with said pilot trace to estimate the time shift in said selected seismic data trace resulting from velocity anisotropy in the earth's subsurface; repeating steps (b) and (c) until all traces within said gather have been correlated with a pilot trace; adjusting each said selected seismic data trace by the amount of the estimated time shift in each said selected seismic data trace resulting from velocity anisotropy; determining the incidence angle for each selected seismic data trace; and applying a least squares analysis process to reflection coefficient, source-receiver azimuth angle and incidence angle data of said seismic data

traces to calculate the amplitude variation with azimuth and amplitude variation with offset in seismic data traces included in said gather.

14. (Original) A method for processing seismic data, comprising: (a) forming a gather of seismic data traces; (b) forming a pilot trace by combining a selected plurality of said seismic data traces within a selected time window; (c) cross-correlating a selected seismic data trace included in said gather with said pilot trace to estimate the time shift in said selected seismic data trace resulting from velocity anisotropy in the earth's subsurface; repeating steps (b) and (c) until all seismic data traces within said gather have been correlated with a pilot trace; and applying a least squares analysis process to the time shifts of said seismic data traces to calculate the velocity variation with azimuth in seismic data traces included in said gather.

15. (Original) The method of claim 13 further comprising utilizing a least squares analysis to estimate errors associated with the calculation of amplitude variation in said selected seismic data traces.

16. (Original) The method of claim 14 further comprising utilizing a least squares analysis to estimate errors associated with the calculation of time shift variation in said selected seismic data traces.

17. (Original) The method of claim 14 further comprising utilizing a least squares analysis to estimate errors associated with the calculation of velocity variation in said selected seismic data traces.

18. (Original) A method for processing seismic data comprising: (a) forming a gather of seismic data traces; (b) performing a surface consistent statics computation on said seismic data traces; (c) cross-correlating successively selected seismic data traces in said gather with a pilot trace formed by combining a selected plurality of seismic data traces in said gather within selected time windows to estimate the time shift in said seismic data traces resulting from azimuthal velocity anisotropy in the earth's subsurface, and applying a least squares analysis process to the time shifts of said seismic data traces to calculate the velocity variation with azimuth in seismic data traces included in said gather; (d) utilizing the calculated velocity variations with azimuth to calculate time shifts in seismic data traces included in said gather; (e) applying said calculated time shifts to said seismic data traces included in said gather; repeating steps (b)-(e); and applying a least squares analysis process to reflection coefficient, source-receiver azimuth angle and incidence angle data of said seismic data traces to calculate the amplitude variation with azimuth and amplitude variation with offset in seismic data traces included in said gather.

19. **(Cancel)**

20. **(Cancel)**

21. **(Cancel)**

22. **(Cancel)**

23. **(Cancel)**

24. (Original) A digital computer programmed to utilize seismic data traces obtained over a region of the earth's subsurface to perform a process comprising the steps of: forming a gather of seismic data traces; forming a pilot trace by combining a selected plurality of said seismic data traces; and cross-correlating a selected seismic data trace included in said gather with said pilot trace to estimate the time shift in said selected seismic data trace resulting from velocity anisotropy in the earth's subsurface.

25. (Original) A device which is readable by a digital computer having instructions defining the following process and instructions to the computer to perform said process: forming a gather of seismic data traces; forming a pilot trace by combining a selected plurality of said seismic data traces within a selected time window; and cross-correlating a selected seismic data trace

included in said gather with said pilot trace to estimate the time shift in said selected seismic data trace resulting from velocity anisotropy in the earth's subsurface.

26. (Original) The device of claim 25 wherein said device is selected from the group consisting of a magnetic tape a magnetic disk, an optical disk and a CD-ROM.

27. (Original) The method of claim 1 further comprising utilizing the estimated time shift of said seismic data traces to calculate at least one of: i) an amplitude variation with azimuth value in seismic data traces included in said gather and ii) a velocity variation with azimuth value in seismic data traces included in said gather.

28. (Original) The method of claim 27 wherein utilizing the estimated times shift further comprises a least squares analysis process.

29. (Original) The method of claim 1 further comprising utilizing the estimated time shift of said seismic data traces to calculate the amplitude variation with incidence angle in seismic data traces included in said gather.

30. (Original) The method of claim 29 wherein utilizing the estimated times shift further comprises a least squares analysis process.

31. (Original) The method of claim 1 further comprising utilizing the estimated time shift, reflection coefficient, source-receiver azimuth angle and incidence angle data for seismic data traces included in said gather to calculate an amplitude variation with azimuth value.

32. (Original) The method of claim 1 further comprising: determining the incidence angle for seismic data traces included in said gather; and applying a least squares analysis process to reflection coefficient, source-receiver azimuth angle and incidence angle data for seismic data traces included in said gather to calculate the amplitude variation with azimuth in seismic data traces included in said gather.

33. (Original) The method of claim 1 wherein estimating the time shift further comprises cross-correlating said seismic data traces with a pilot trace composited from a plurality of traces of said seismic data gather.

34. (Original) The method of claim 33 wherein forming said pilot trace further comprises compositing a plurality of traces within a predetermined spatial window within said gather of seismic traces.

35. (Original) The method of claim 1 further comprising using the estimated time shift in said

seismic data traces for determining a time shift correction for seismic data traces included in said gather.

36. (Original) The method of claim 35 further comprising applying said time shift correction to said seismic data traces.

37. (Original) The method of claim 36 further comprising performing an amplitude variation with incidence angle analysis on said corrected seismic data traces.

38. (Original) The method of claim 36 further comprising performing at least one of: i) an amplitude variation with azimuth analysis on said corrected seismic data traces and ii) a velocity variation with azimuth analysis on said corrected seismic data traces.

39. (Original) The method of claim 36 further comprising determining a surface consistent statics correction for said seismic data traces.

40. (Original) A digital computer programmed to utilize seismic data traces obtained over a region of the earth's subsurface to perform a process comprising:

(a) forming a gather of seismic data traces; and

(b) cross-correlating seismic data traces included in said gather within a time window to

estimate a time shift in the seismic data traces resulting from velocity anisotropy in the earth's subsurface.

41. (Original) The digital computer of claim 40 further programmed to perform a process comprising utilizing the estimated time shift of said seismic data traces to calculate at least one of: i) an amplitude variation with azimuth value in seismic data traces included in said gather and ii) a velocity variation with azimuth value in seismic data traces included in said gather.

42. (Original) The digital computer of claim 41 wherein utilizing the estimated time shift further comprises a least squares analysis process.

43. (Original) The digital computer of claim 40 further programmed to perform a process comprising applying a least squares analysis process to the time shift of said seismic data traces to calculate an amplitude variation with incidence angle value in seismic data traces included in said gather.

44. **(Cancel)**

45. (Original) The digital computer of claim 40 further programmed to perform a process to

calculate an amplitude variation with azimuth value utilizing the estimated time shift, reflection coefficient, source-receiver azimuth angle and incidence angle data for seismic data traces included in said gather.

46. (Original) The digital computer of claim 40 wherein the process for estimating the time shift further comprises cross-correlating said seismic data traces with a pilot trace composited from a plurality of traces of said seismic data gather.

47. (Original) The digital computer of claim 46 wherein the pilot trace further comprises a plurality of traces composited from within a predetermined spatial window within said gather of seismic traces.

48. (Original) The digital computer of claim 40 further programmed to perform a process comprising using the estimated time shift in said seismic data traces for determining a time shift correction for said seismic data traces included in said gather.

49. (Original) The digital computer of claim 48 further programmed to perform a process comprising applying said time shift correction to said seismic data traces to form corrected seismic data traces.

50. (Original) The digital computer of claim 49 further programmed to perform a process comprising performing at least one of: i) an amplitude variation with azimuth analysis on said corrected seismic data traces and ii) a velocity variation with azimuth analysis on said corrected seismic data traces.

51. (Original) The digital computer of claim 49 further programmed to perform a process comprising performing an amplitude variation with incidence angle analysis on said corrected seismic data traces.

52. (Original) The digital computer of claim 49 further programmed to perform a process comprising determining a surface consistent statics correction for said seismic data traces.

53. (Currently Amended) A system for processing seismic data obtained over a region of the earth's subsurface comprising ~~a process for~~:

(a) storage media for storing ~~forming~~ a gather of seismic data traces; and

(b) a processor for cross-correlating seismic data traces included in said gather within a time window to estimate a time shift in the seismic data traces resulting from velocity anisotropy in the earth's subsurface.

54. (Currently Amended) The system of claim 53 ~~further comprising a process for utilizing~~

wherein the estimated time shift of said seismic data traces is utililized to calculate at least one of: i) an amplitude variation with azimuth value in seismic data traces included in said gather and ii) a velocity variation with azimuth value in seismic data traces included in said gather.

55. (Original) The system of claim 54 wherein utilizing the estimated time shift further comprises a least squares analysis process.

56. (Currently Amended) The system of claim 53 ~~further comprising a process for utilizing~~ wherein the time shift of said seismic data traces is utililized to calculate an amplitude variation with incidence angle value in seismic data traces included in said gather.

57. (Original) The system of claim 56 wherein utilizing the estimated time shift further comprises a least squares analysis process.

58. (Currently Amended) The system of claim 53 further comprising ~~a process to calculate~~ determining an amplitude variation with azimuth value utilizing the estimated time shift, reflection coefficient, source-receiver azimuth angle and incidence angle data for seismic data traces included in said gather.

59. (Original) The system of claim 53 wherein cross-correlating said seismic data traces further comprises cross-correlating said seismic data traces with a pilot trace composited from a plurality of traces of said seismic data gather.

60. (Original) The system of claim 59 wherein the pilot trace further comprises a plurality of traces composited from within a predetermined spatial window within said gather of seismic traces.

61. (Currently Amended) The system of claim 53 ~~further comprising a process for using~~ wherein the estimated time shift in said seismic data traces is utililized for determining a time shift correction for said seismic data traces included in said gather.

62. (Currently Amended) The system of claim 61 further ~~programmed to perform a process~~ comprising applying said time shift correction to said seismic data traces to form corrected seismic data traces.

63. (Original) A method for processing seismic data to estimate a time shift resulting from velocity anisotropy in the earth's subsurface, comprising:

(a) forming a gather of seismic data traces;

(b) cross-correlating seismic data traces included in said gather within a time window to

estimate a time shift in the seismic data traces resulting from velocity anisotropy in the earth's subsurface; and

(c) calculating, with the estimated time shift in the seismic data traces, at least one of i) an amplitude variation with incidence angle, ii) an amplitude variation with azimuth, and iii) a velocity variation with azimuth for the seismic traces.

64. (Original) The method of claim 63 wherein said seismic data traces are cross-correlated with a pilot trace composited from a plurality of traces within a predetermined spatial window.

65. (Original) The method of claim 63 further comprising determining an anisotropy time-shift correction from the estimated time shift.

66. (Original) The method of claim 65 wherein the anisotropy time shift correction is applied to the seismic data traces.

67. (Original) The method of claim 63 further comprising determining a surface consistent statics correction for the seismic data traces.